

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-67
Relating to Exemptions under Section 27156
of the Vehicle Code

CRAGAR INDUSTRIES, INC.
"HOT PIPES" TUBING EXHAUST HEADERS

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 of the Health and Safety Code and Executive Order G-30A;

IT IS ORDERED AND RESOLVED: That the installation of the "Hot Pipes" tubing exhaust headers manufactured by Cragar Industries, Inc., 19007 S. Reyes Avenue, Compton, California 90224 has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1975 and 1976 model-year vehicles originally equipped with catalytic converters except those vehicles originally equipped with back-pressure modulated exhaust gas recirculation systems (i.e. certain Ford, Pontiac and Oldsmobile vehicles). All emission control systems shall be retained except the manifold heat control valve on Chrysler Corporation vehicles and the early fuel evaporation (EFE) valve on 1976 General Motors vehicles. The conversion of single exhaust systems to dual exhaust systems shall not be permitted on catalyst equipped vehicles.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "HOT PIPES" TUBING EXHAUST HEADERS.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the State board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the State board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at Sacramento, California, this 28 day of July, 1976.

Original signed by
Thomas C. Austin
Deputy Executive Officer-Technical

State of California

AIR RESOURCES BOARD

June 30, 1976

Staff Report

Evaluation of Cragar Industries Inc.,
"Hot Pipes" Tubing Exhaust Headers
for Compliance with the Requirements
of Section 27156 of the Motor Vehicle Code

I. Introduction

On December 10, 1975, the Air Resources received an application from Cragar Industries, Inc., Compton, California, requesting an exemption from the prohibitions of Vehicle Code Section 27156 for tubing exhaust headers. The applicant requests that this exemption be granted for 1975 and 1976 vehicles equipped with exhaust catalysts (See Appendix A). Supplemental test data was submitted by the manufacturer on three vehicles and confirmatory testing was conducted on two vehicles.

Exhaust header installations on 1974 and older model-year vehicles have been previously allowed under the ARB's replacement parts policy (considered equivalent to original equipment) with the provision that all emission controls be left intact. For newer vehicles equipped with exhaust catalysts, headers are considered to be a significant modification of the exhaust system and an emissions evaluation is required.

This report does not evaluate the conversion of single exhaust systems to dual exhaust systems on catalyst equipped vehicles.

II. Description

Tubing exhaust headers are a set of steel tubes designed to replace OEM cast iron exhaust manifolds. Individual tubes, one per engine cylinder, connect to each exhaust port on the cylinder head. These provide large radius bends as opposed to the short, right angle bends of the OEM manifold (See Figure 1). The individual tubes collect together upstream from the catalytic converters or from the exhaust cross-over, depending on the application (See Figure 2).

Headers are designed for a particular engine to improve efficiency and decrease fuel consumption. The tube diameter, tube length, collector diameter and collector length are optimized to accomplish the exhaust tuning. The ranges for these dimensions are as follows:

Tube Diameter	1 1/2 - 2 inches	(40-50 mm)
Tube Length	18 - 46 inches	(45-115 cm)
Collector Diameter	2 1/2 - 3 1/2 inches	(65-90 mm)
Collector Length	3 - 10 inches	(8-25 cm)

The exhaust header kits manufactured by the applicant are designed to replace the exhaust manifold without defeating the emissions control system. Each header kit is designed for a particular vehicle application and contains tuned headers and all necessary parts, fittings and flanges for "bolt-on" installation. The kit maintains the air injection at original equipment locations by providing fittings into either the tubing headers or exhaust head pipe (this installation may require some minor bending of the air lines). The heat riser valve is maintained with an adapter kit provided in the header kit except

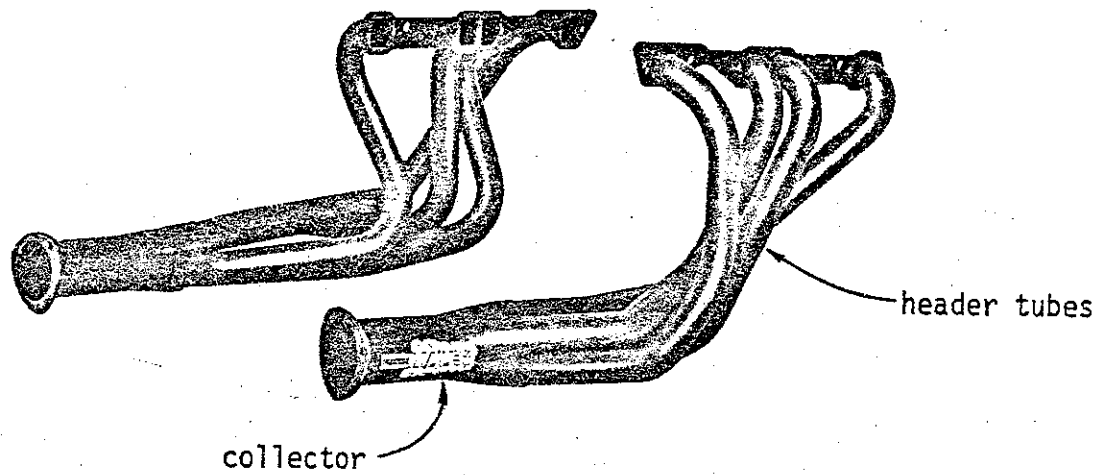


Figure 1 - Tubing Exhaust Headers with Collectors

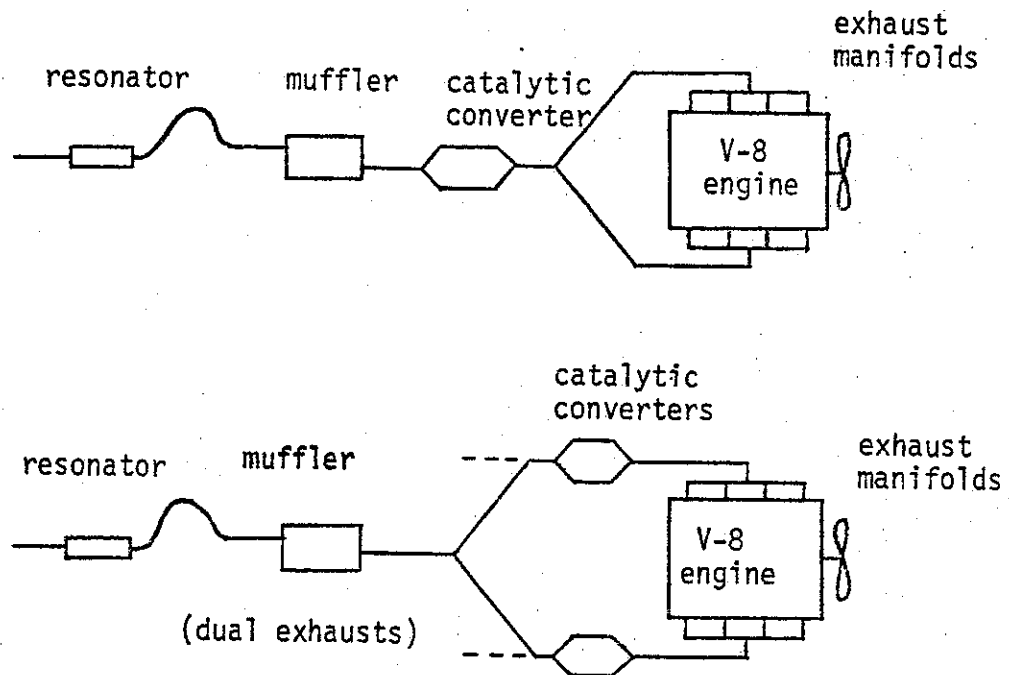


Figure 2 - Typical OEM Exhaust Systems

on Chrysler and 1976 GM vehicles (On Chrysler vehicles, the heat riser valve is integrally part of the OEM manifold. On 1976 GM vehicles, the vacuum control for the valve could not be easily modified). The heated air intake including the exhaust manifold stove is replaced with a unit supplied with the kit. A typical replacement unit is shown in Figure 3 (this unit uses a much smaller heated surface than original equipment). The catalytic converter is not relocated and all thermal, overtemperature sensors are maintained.

A tuned exhaust system generates low pressure (rarefaction) pulses that propagate up the header tube toward the exhaust valve. During certain rpm ranges, these pulses arrive when the exhaust and intake valves are open (during valve overlap). These pulses then scavenge residual exhaust gases from the combustion chamber (residual gases reduce the size of the incoming fuel-air charge as well as dilute this charge). "Scavenging" increases volumetric and thermal efficiencies. Headers may also reduce the exhaust system back-pressure during certain operating modes and this, too, will increase the flow of residual exhaust gases from the combustion chamber.

III. Claimed Benefits

The applicant claims an improvement in highway fuel economy of 6-10% for the header kit installation. This claim is based on CVS testing and highway economy tests. The improvement in fuel economy is attributed to reduced back-pressure at highway speeds.

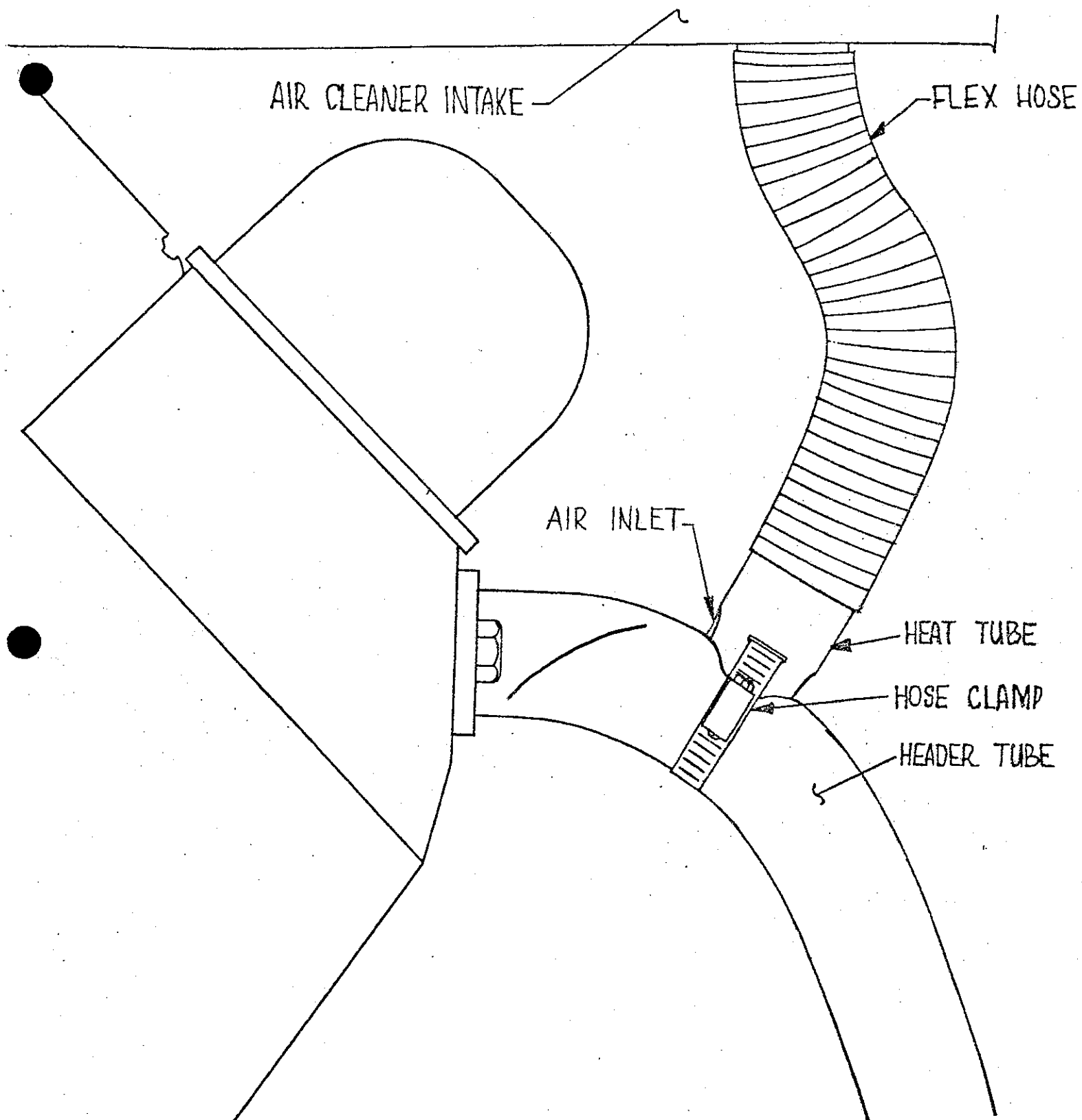


Figure 3 - Replacement Unit for
Heated Air Intake

IV. Potential Emission Effects

Exhaust headers may increase HC and NOx emissions because of scavenging and reduced back-pressure. The residual exhaust gases in the combustion chamber are rich in HC and are normally burned in successive engine cycles. Scavenging and reducing back-pressure will increase the flow of these gases and HC into the exhaust system (Depending on the amount of valve overlap, scavenging of the incoming fuel-air charge can even occur under high load, high speed conditions). In addition, the residual gases dilute the incoming fuel-air mixture and reduce the peak combustion temperatures. Removing these gases will increase combustion temperatures and increase the formation of NOx. Reducing back-pressure may also affect the EGR system, both those with and without back-pressure modulation, and result in increased NOx.

The exhaust header installation may also affect emissions through other mechanisms. First, the heat riser and heated air modifications may increase HC due to poor fuel vaporization under cold-start conditions. HC and CO emissions may also increase where excessive heat transfer through the header tubes lowers exhaust temperatures and affects the exhaust catalyst operation. Other emission related problems could include heating of fuel lines and short-circuiting of spark plug wires.

The operation of the exhaust catalyst could mask some HC and CO effects of the headers.

V. Evaluation

The applicant conducted a test program with three catalyst-equipped vehicles, a 1975 Chevrolet (350-4V), a 1975 Ford (351-2V) and a 1975 Chrysler (318-2V). CVS-75 emissions tests and EPA Highway Cycles were run on these vehicles at Olson Engineering, Huntington Beach, California. Each vehicle was tested in the stock configuration and with a header kit installation. Table I summarizes these test results.

The applicant's CVS-75 test data showed no emission increases with the header kit installation. The CVS sample bags (3 per test) were also compared, baseline to headers, and showed no emission trends. The Highway Cycle tests showed that headers increased fuel economy on two vehicles (6-7%) and decreased fuel economy on one vehicle (2%).

Modal data was collected during the applicant's CVS-75 tests to evaluate any transient effects. The analysis of this data showed no trends toward increased emission during acceleration or cruise modes or during the first 113 seconds of the CVS-75. In addition, exhaust gas temperatures (catalyst inlet and outlet), exhaust gas pressure (catalyst inlet), and manifold vacuum were measured during selected modes. No conclusions could be drawn from these measurements except that headers caused no gross changes from baseline during the CVS-75 testing.

Table I - Cragar Test Results

Vehicle #1: 1975 Chevrolet Camaro (350-4V) single catalyst

CVS-75:	<u>HC</u> <u>gm/mi</u>	<u>CO</u> <u>gm/mi</u>	<u>NOx</u> <u>gm/mi</u>	<u>Economy</u> <u>mpg</u>
Baseline	0.9	4.3	2.2	14.6
Headers	0.6	3.5	2.2	14.7
Net Change	-33%	-19%	0%	+1%

EPA Highway Cycle: Baseline, 18.0 mpg; Headers, 19.0 mpg (+6%)

Vehicle #2: 1975 Ford Torino (351-2V) dual catalysts

CVS-75:	<u>HC</u> <u>gm/mi</u>	<u>CO</u> <u>gm/mi</u>	<u>NOx</u> <u>gm/mi</u>	<u>Economy</u> <u>mpg</u>
Baseline	0.5	3.5	1.3	10.2
Headers	0.5	2.8	1.0	10.9
Net Change	0%	-20%	-23%	+7%

EPA Highway Cycle: Baseline, 15.2 mpg; Headers, 16.2 mpg (+7%)

Vehicle #3 1975 Chrysler Cordoba (318-2V) single catalyst

CVS-75:	<u>HC</u> <u>gm/mi</u>	<u>CO</u> <u>gm/mi</u>	<u>NOx</u> <u>gm/mi</u>	<u>Economy</u> <u>mpg</u>
Baseline	0.5	5.5	1.4	10.3
Headers*	0.5	5.2	1.4	9.9
Net Change	0%	-5%	0%	-4%

EPA Highway Cycle: Baseline, 13.9 mpg; Headers*, 13.6 mpg (-2%)

*without heat riser valve

The ARB conducted a confirmatory test program on two vehicles (Reference ARB test report Project V-26, May 1976). The applicant supplied two catalyst-equipped vehicles for testing, a 1976 Chevrolet (350-4V) and a 1976 Ford (351-2V). One CVS-75, three hot-start CVS-72 and one loaded mode test were run on each vehicle, with and without a header kit installation. A summary of the emission test data is given in Tables II and III.

The CVS-75 tests generally showed no emission increases with headers and a small improvement in fuel economy of 8-9% (one vehicle did show a slight increase in NOx). The CVS-75 sample bags were compared baseline to headers and no emissions trends were noted. The CVS-72 and loaded mode tests supported the CVS-75 results.

During the ARB testing, the carburetor inlet air and exhaust gas temperatures were recorded to determine any heat transfer effects of the header kit installation. The carburetor inlet air was measured in the air cleaner. The exhaust gas temperatures were measured at the catalyst inlet on one vehicle and at the catalyst outlet on both vehicles. Figures 4, 5, 6 and 7 summarize the temperature measurements.

The heated air intake modification with the header installation functioned approximately the same as the stock configuration on the 1976 Chevrolet (the temperature recorder malfunctioned during the testing of the 1976 Ford). After the preheat temperature was achieved (119°F) and the heated air intake valve closed, the intake air temperature went to 85°F in the baseline tests while the intake air went to 128°F in the header

Table II - ARB Emission Test Results

Test Vehicle: 1976 Chevrolet Silverado C-10 Pick-Up
(350-4V), single catalyst (pellet-type)

CVS-75	HC <u>gm/mi</u>	CO <u>gm/mi</u>	NOx <u>gm/mi</u>	Economy <u>mpg</u>
Baseline	0.6	4.1	1.5	11.2
Headers*	0.7	3.9	1.8	12.2
Net Change	+17%	-5%	+20%	+9%
Hot-Start CVS-72:				
Baseline**	0.4	1.6	1.7	11.4
Headers*+	0.6	1.0	1.8	12.8
Net Change	+50%	-38%	+6%	+12%
Loaded Mode:	HC <u>ppm</u>	CO <u>%</u>	NOx <u>ppm</u>	
High Cruise				
Baseline	11	0.05	553	
Headers*	11	0.05	815	
Low Cruise				
Baseline	11	0.05	150	
Headers*	11	0.05	176	
Idle				
Baseline	11	0.05	25	
Headers*	21	0.05	25	

*Without heat riser valve

**Average of three tests

+Average of two tests; engine was misfiring during one test possibly caused by overheating of the fuel line (1/2" from a header tube) or a spark plug misfire.

Table III - ARB Emission Test Results

Test Vehicle: 1976 Ford E-100 Van, (351-2V), single catalyst (monolithic)
(No heat riser valve in stock configuration)

CVS-75:	HC gm/mi	CO gm/mi	NOx gm/mi	Economy mpg
Baseline	0.5	6.2	1.6	9.8
Headers	0.5	5.2	1.7	10.6
Net Change	0%	-16%	+6%	+8%

Hot Start CVS-72:

Baseline*	0.3	2.9	1.8	10.6
Headers*	0.3	2.7	1.8	10.9
Net Change	0%	-7%	0%	+3%

*Average of three tests

Loaded Mode: No emissions comparison. The baseline test was run but a spark plug failed during the header test (cracked insulator).

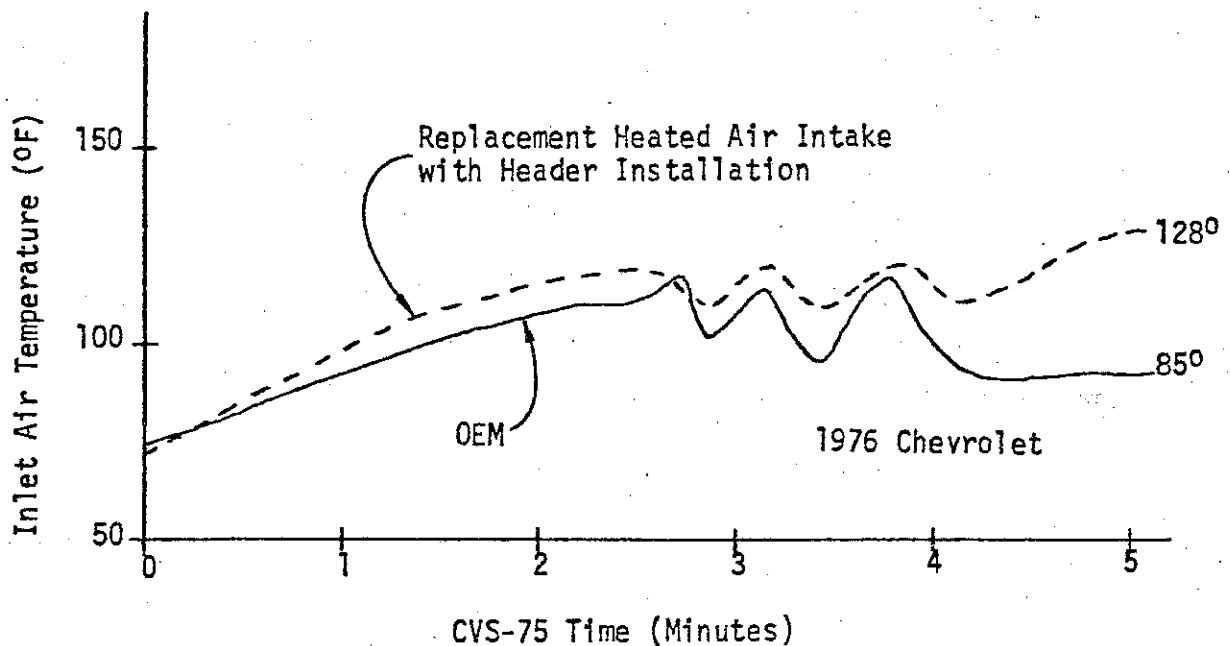
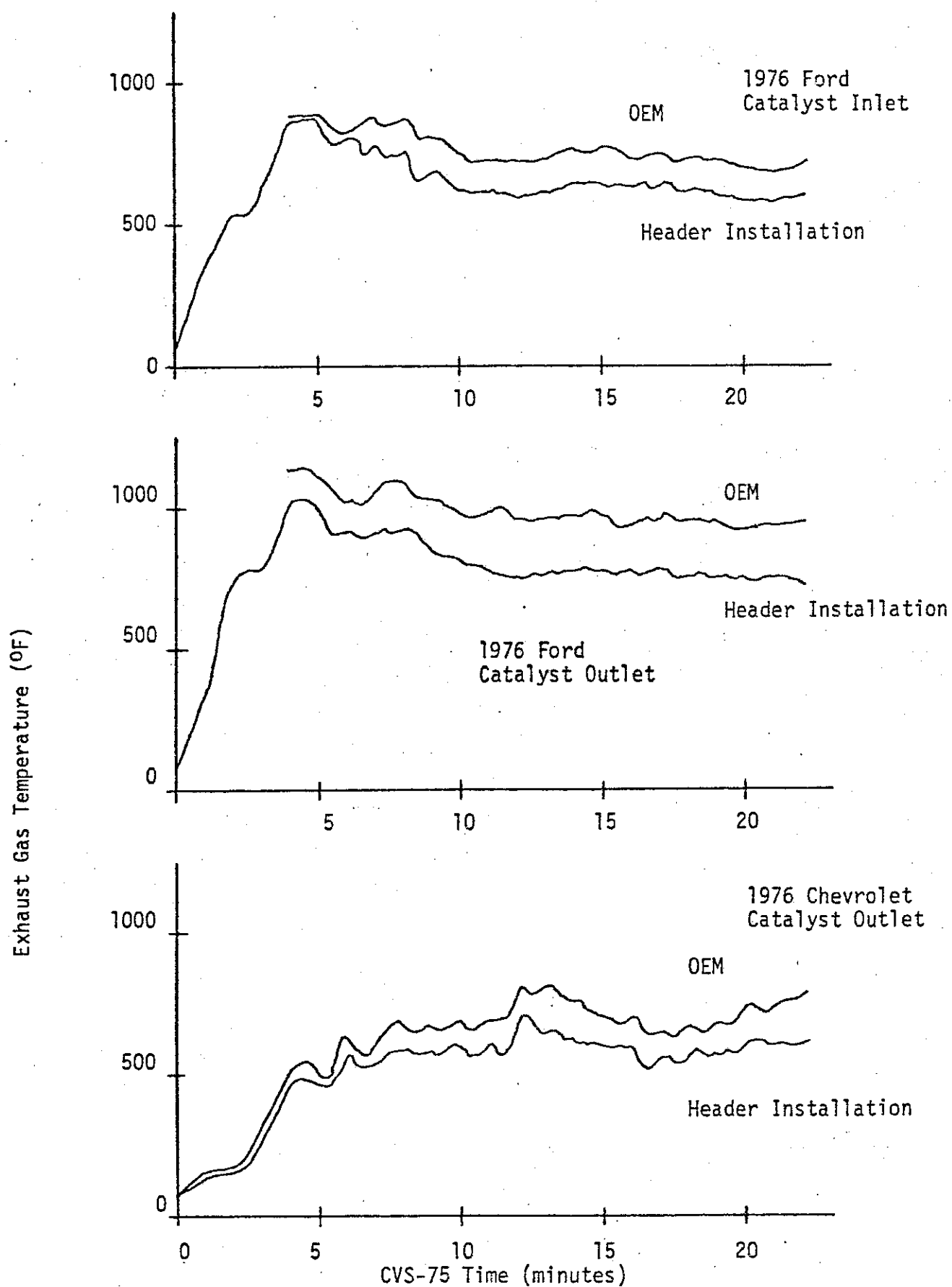


Figure 4 - Carburetor Inlet Air Temperature During CVS-75

Figures 5, 6, 7-Exhaust Gas Temperatures During CVS-75



tests. This may have been the result of engine compartment heating by the headers (See discussion to follow).

Figures 5, 6 and 7 show that the exhaust gas temperatures at the catalyst were reduced with the headers. The catalyst inlet temperatures on the 1976 Ford averaged 120°F lower with the headers. The catalyst outlet temperatures averaged 195°F lower on the Ford and 115°F lower on the Chevrolet (these averages are based on exhaust temperatures after the first 8-10 minutes of the CVS-75). There were no differences in catalyst "light-off" times between the header and OEM configurations.

The lower inlet temperatures with headers apparently are the result of the header tubes with their extra surface area transferring heat into the engine compartment (This may account for the rise in carburetor inlet air temperature during the header testing). As a result, the catalysts operated at reduced temperatures. This should improve catalyst durability but the higher engine compartment temperatures could adversely affect the durability of other components (ignition wiring, vacuum hoses, etc.).

The CVS-75 data from both the applicant's and the ARB's test programs were combined to give a larger data base and to determine if there was any correlation between various parameters and the changes in emissions or fuel economy. Table IV indicates that there may be some correlation between the amount of valve overlap and the fuel economy benefits of headers. In addition, CO emissions were reduced

Table IV - Changes in CVS-75 Emissions with Headers

Test Vehicle	N/V ¹	Valve Overlap Deg.	Valve Overlap Deg.-In.	HC %Δ	CO %Δ	NOx %Δ	Economy %Δ
1975 Ford (315-2V)	38.1	47	0.618	0	-20	-23	+7%
1976 Ford (351-2V) ²	38	41	0.49	0	-16	+6	+8%
1976 Chevrolet (350-4V) ^{2,3}	38.6	40	0.355	+17	-5	+20	+9%
1975 Chevrolet (350-4V)	34.1	40	0.355	-33	-19	0	+1%
1975 Chrysler (318-2V) ³	37.3	26	n.a.	0	-5	0	-4%

1. Engine RPM/Vehicle MPH in high gear.

2. Tested at the ARB laboratory. The remaining vehicles were tested at Olson Engineering.

3. Without heat riser valve during header testing.

n.a. = not available

in all five back-to-back tests; a comparison of the CVS sample bags showed reduced CO with headers in 13 out of 15 bag comparisons.

The tendency for increased fuel economy with headers on engines with large valve overlap indicates improved efficiency due to reduced back-pressure and/or scavenging. Valve overlap normally reduces efficiency except during high speed, high mass flow conditions. However, reducing back-pressure during normal operation acts to offset the dilution and volumetric effects of valve overlap. Scavenging, if it is occurring, has a broader operational (rpm) range with large valve overlap and, therefore, headers would have broader benefits on these engines.

Reduced CO usually indicates leaning of the fuel-air mixture but the header installation could possibly have affected the catalyst operation. The fuel-air mixture might have been affected by the increase in underhood temperatures (if only in chassis dynamometer testing); however, the resulting increase in carburetor inlet temperature should cause enrichment; a possible explanation for lower CO might be a reduction in fuel-air ratio variations from cylinder to cylinder caused by improved fuel vaporization. Lowering catalyst temperatures could increase CO oxidation if the catalyst temperatures are excessively high (the catalyst oxidation process is a surface reaction between the rare-metal catalyst and the exhaust gases. High surface temperatures act to repel the gases and inhibit the oxidation reaction). Nonetheless, the mechanism for a CO reduction with headers is not readily apparent.

VI. Conclusion and Recommendations

This evaluation of tubing exhaust headers generally showed no emission increases on the vehicles and emission control systems tested; however, other emission control systems, namely back-pressure modulated EGR systems, could show adverse effects with headers. The heated air intake replacement appeared to operate satisfactorily and the deletion of the heat riser valve on certain vehicles did not appear to have any emission effects under CVS test conditions.

The CVS tests also demonstrated a small increase in fuel economy. This increase appears to be related to engine design (valve overlap). The applicant's claim of a 6-10% improvement in highway fuel economy was supported by the ARB tests.

The staff recommends that Cragar Industries be granted an exemption from the prohibitions of Vehicle Code Section 27156. This exemption should be for 1975 and 1976 model-year vehicles equipped with catalytic converters except those vehicles originally equipped with back-pressure modulated EGR systems. All emission control systems should be retained except the heat riser valve on Chrysler Corporation vehicles and 1976 General Motors vehicles. The conversion of single exhaust systems to dual exhaust systems was not evaluated and should not be permitted.



INDUSTRIES INC.

POST OFFICE BOX 5626
19007 S. REYES AVENUE
COMPTON, CALIF. 90224

(213) 639-6211

December 9, 1975

Air Resources Board Laboratory
9528 Telstar Ave.
El Monte, CA. 91731

Attention: Don Drachand, Chief Vehicle Compliance

Dear Mr. Drachand:

Regarding your recent letter, on behalf of CRAGAR Industries, Inc., I do here by request the board would give consideration to exemption status of the tubing exhaust headers manufactured by our company for the 75 & 76 catalytic equipped model years. Our tubing exhaust headers are designed to replace the cast iron exhaust manifolds on existing OE installations. The tubing exhaust header represents replacement of the existing cast iron manifolds, and because of this extended length, there is a replacement of the head pipe that would lead from the cast iron manifold to the catalytic convertor or muffler depending on the situation.

The objective of tubing exhaust headers is improvement in engine efficiency, namely mileage improvement. This is derived from the free flowing individual tubes that connect to the cylinder head. The tubing exhaust header has smooth large radius bends as opposed to the short right angle bends of the stock cast iron configuration.

Because of the free flowing exhaust passage the cylinder scavenges more efficiently on the exhaust cycle and results in improved combustion from which we derive improvements in mileage and reduction in exhaust emissions.

Regarding item 2B, II3 on instruction sheets, I have enclosed a group of the sheets that are currently issued with the existing headers. I envision a considerable change in the sheets to accomodate the 75-76 vehicles. As it is now planned, these vehicles will have a complete kit with another part number. It will include all necessary pieces to bolt directly to the converter. It is intended that all tubing diameters

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will be matched and the flange will be supplied that will bolt on to existing converters directly.

We feel that this bolt on feature requiring no cutting or welding will certainly reduce the instances of tampering.

The Ford and General Motors kits will include the special flanged adaptation kit to readily accept the vacuum operated butterfly that is furnished with the OE system.

As the case of our previous system, we will include all necessary parts and accessories to accommodate the air pump fittings, etc. The only problem area that has come up is some of the Chrysler products have the heat riser valve as an integral part of the cast iron manifold and it is not removable. The test data on the 75 Dodge supplied was without this valve installed. The Cold Start data looks good on this car and I don't see any problem in its elimination on these vehicles. As I recall, this has been an acceptable practice on the 74 & earlier vehicles. Our present plans do not include any of the Chrysler products for the 75-76 model years. Possibly it would better to discuss this item personally if you find further information is necessary.

Regarding paragraph 5, it is our intention at this time to request exemption for all domestic 75 & 76 models. As you can see from our enclosed catalog, the list is really very small and we would expect to use similar listing for the 75 & 76 models. Our present plans are to include the Camaro, $\frac{1}{2}$ ton Chevy Van and pick up, Chevette and Monza as our first units. Selected Ford models would be added later. Other than applying for exemption for each individual vehicle I don't know what other information you would require.

As I mentioned to Dick Kenny before, we would be most pleased to offer a vehicle with tubing exhaust headers to you for test purposes. The Camaro we have retained in service since the installation and could be made available to you for a few days for evaluation. If you would choose to select an existing test vehicle for an installation, we would have to discuss something that could readily be fitted similar to our existing catalog listing. I doubt if it would prove practical to have your personnel install headers at your facility, but I am sure we could work out an installation at our plant with your personnel supervising, etc. We can discuss this item further if you desire.

I would like to discuss our thinking and general design criteria and the way we approach these vehicles for application. Obviously the individual model selection is based on estimated sales numbers. As it now stands, the $\frac{1}{2}$ ton Chevy pick-up and van represents the larger volume sales for our headers and as

APPENDIX A (cont'd.)

December 9, 1975
Page 3

I mentioned, we would certainly tool up these vehicles first. Our objectives are to include all necessary hardware and instructions so that the customer can bolt up all existing pollution control devices such as air injection fittings and heat risers. Detailed instructions and drawings would be supplied as well as clear language as to fines and penalties that can result if these devices are left disconnected.

It is also planned that all kits are to bolt to existing muffler and exhaust systems, no attempt will be considered at this time to add any converters in an effort to add dual exhaust to vehicles that presently have single exhaust.

It was mentioned at one time that some thoughts existed as to plug wire problems etc. I showed an installation to Dick Kenny at one time and showed him that really this was not a problem. We are certainly aware of the problems that could arise from a shorted plug wire with the converter vehicles. The plug wires are frequently further from the exhaust tubing than many OE systems. As I mentioned previously, the type that purchase performance equipment such as headers frequently upgrade the wires to better quality than OE, so I feel this plug wire problem does not exist. The headers in the area of the cylinder head is virtually identical to the 74 and earlier and certainly there has not been a rash of problems reported to us or the ARB.

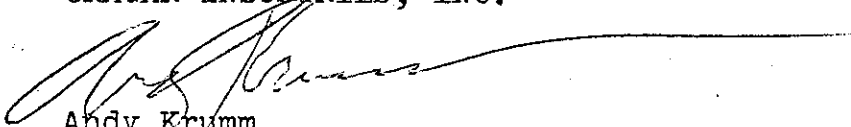
As far as existing over temp circuits, I am not aware of any vehicles whereby we affect these areas. The existing converter location is maintained so the sensors are not disturbed.

I hope this answers all of the questions the board has. If there are any areas of concern, possibly a meeting will best accomplish this purpose.

I would again like to thank the board for their time and cooperation in this matter.

Sincerely,

CRAGAR INDUSTRIES, INC.

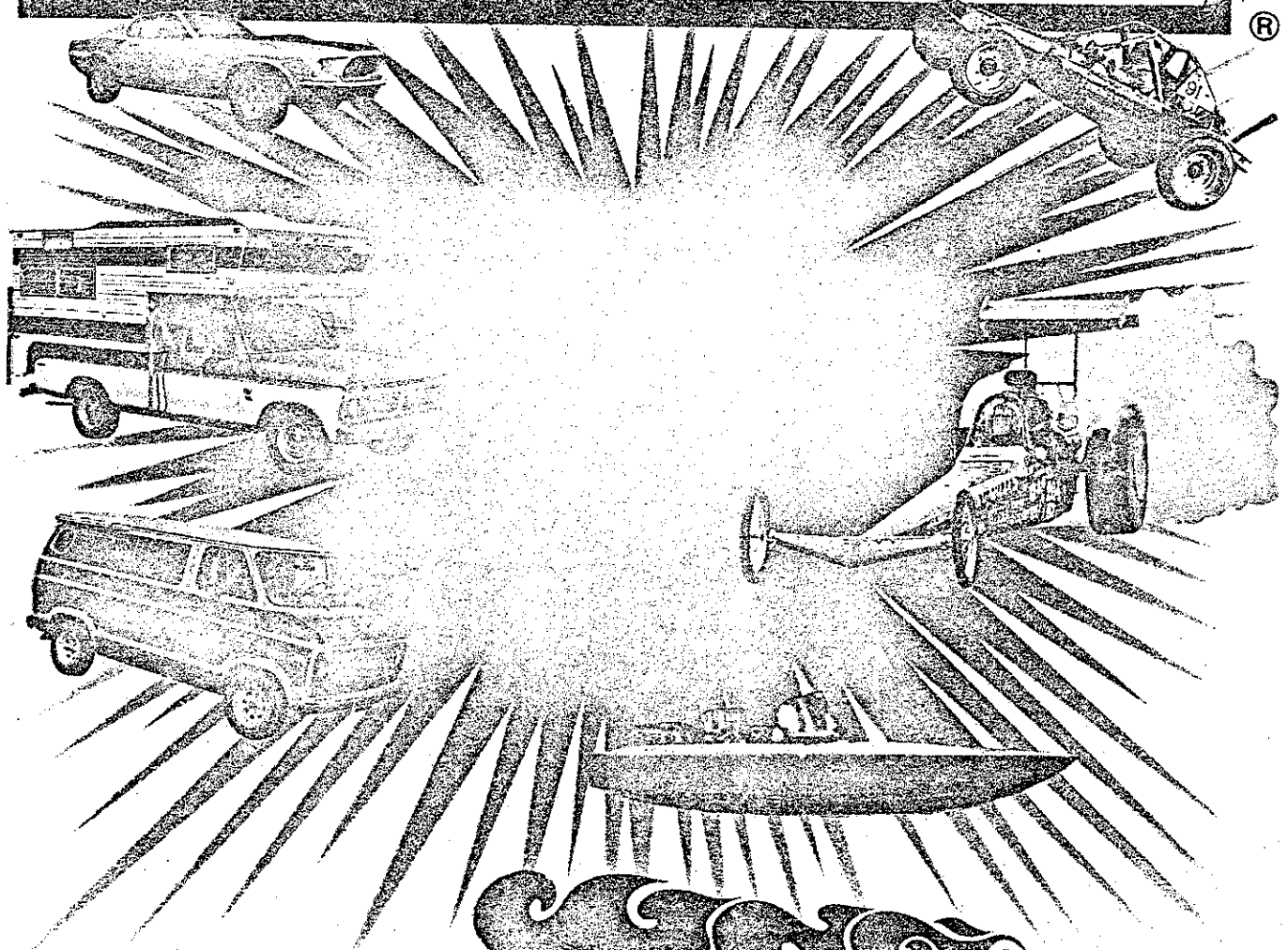


Andy Krumm
Director - Research & Development

AK/ks

FOR THE TRADE

CRAGAR



CRAGAR HOTPIPES



HEADERS and R.V. DUAL EXHAUST KITS

PASSENGER CARS

HEADER KIT: Includes gaskets, swedges and all hardware necessary for bolt-on installation, including generator or alternator bracket.

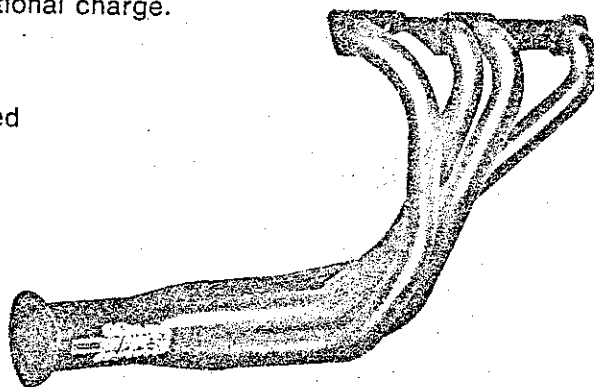
For Chevrolet Headers, excluding those footnoted, that require smog fittings, place an "S" after the part number when ordering. See price list for additional charge.

CRAGAR HEADERS ARE DESIGNED TO FIT:

- * Power steering and power brakes, except as footnoted
- * Air conditioning, except as footnoted
- * Chassis exit area, except as footnoted

NOT DESIGNED TO FIT:

- * Column shift transmission linkage - Stick or Automatic without modification to linkage
- * Convertibles (larger frame and larger X member)



HEADERS

Cragar "Hot Pipes" Headers are pure scavenging headers developed by engineers and racers who demand maximum performance from an exhaust system. Cragar headers are constructed to meet exacting factory specifications and all flanges are carefully fitted, heliarc'd and ground smooth for leakproof installation. A full one-year guarantee is included.

DOMESTIC CARS

YEAR & MODEL	Engine	Header Kit Part No.	Tube Size (inch)	Tube Lng. (inch)	Coll. Size (inch)	Coll. Lng. (inch)	INCLUDED IN HEADER KIT for replacement parts only			
							Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.	
CHEVROLET										
55-57 Chevrolet	283-350	45000	1 5/8	32	3	10	45001	45015	45005	
58-64 Chevrolet	283-350	45040	1 3/4	30	3	7	45001	45015	45005	
65-70 Chevrolet (17) (18)	283-350	45050(1)	1 3/4	30	3	10	45001	45015	45005	
64-74 Chevelle (17) (18)	283-350	45200	1 3/4	31	3	10	45001	45015	45005	
64-73 Chevelle (18)	396-454	45210	2	36	3 1/2	10	45011	45016	45006	
63-74 Corvette (17) (18)	283-350	45300	1 3/4	32	3	10	45001	45015	45005	
67-69 Camaro (17) (18)	283-350	45400	1 3/4	32	3	10	45001	45015	45005	
67-69 Camaro (18)	396-454	45410(1)	1 7/8	34	3 1/2	10	45011	45016	45006	
70-73 Camaro (17) (18)	302-400	45420	1 3/4	34	3	10	45001	45015	45005	
74 Camaro (17) (18)	302-400	45440	1 3/4	32	3	10	45001	45015	45005	
68-74 Chevy II and Nova (13) (17) (18)	283-350	45400	1 3/4	32	3	10	45001	45015	45005	
68-74 Chevy II and Nova (18)	396-454	45410(1)	1 7/8	34	3 1/2	10	45011	45016	45006	
71-73 Vega (15)	140	45100	1 3/8	31	2 1/2	8	45101	47504	45009	
DODGE										
67-73 Dart, Swinger	273-340(19)	46000(1)	1 1/2	36	3	10	46001	45015	45007	
67-74 Coronet, Charger, Challenger	318-340(19)	46010(1)	1 5/8	36	3	10	46001	45015	45007	
66-74 (Wedge Engine)	383-400	46110(1)	1 3/4	35	3	10	46111	45015	45005	
71-72 Colt	1800cc	46020*	1 1/2	40	2 1/2	8	46021	47504	45009	
FORD										
64-73 Mustang (3) (8)	Windsor	289-351	46600	1 5/8	35	3	10	46601	45015	45006
67-70 Mustang (3)		390-428	46610	1 7/8	41	3 1/2	10	46611	45016	45008
71 Mustang (13)		429	46620*	2	36	3 1/2	10	46661	45016	45006
70 Mustang (4)	Cleveland (4V)	351	46670	1 7/8	36	3 1/2	10	46631	45016	45012
63-71 Falcon, Fairlane (4) (13)	Windsor	289-302	46650	1 1/2	34	2 1/2	8	46601	45019	45006
70-71 Falcon, Fairlane, Torino (3)	Cleveland (4V)	351	46670	1 7/8	36	3 1/2	10	46631	45016	45012
71-73 Maverick (3)	Windsor	302	46720	1 5/8	34	3	10	46601	45015	45006
72-74 Falcon, Fairlane, Torino (2)	Cleveland (2V)	351-400	46590	1 3/4	36	3	10	46581	45015	45012
-73 Pinto		2000cc	46710	1 1/2	40	2 1/2	8	46711	47504	45009

PASSENGER CARS (Cont.)

YEAR & MODEL	Engine	Header Kit Part No.	Tube Size (inch)	Tube Lng. (inch)	Coll. Size (inch)	Coll. Lng. (inch)	INCLUDED IN HEADER KIT for replacement parts only			
							Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.	
MERCURY										
64-72 Cougar (3) (8)	Windsor	289-351	46600	1½	35	3	10	46601	45015	45006
67-70 Cougar (3)		390-428	46610	1½	41	3½	10	46611	45016	45008
71 Cougar (13)		429	46620*	2	36	3½	10	46561	45016	45006
70 Cougar (4)	Cleveland (4V)	351	46670	1½	36	3½	10	46631	45016	45012
63-70 Comet and Cyclone (4) (13)	Windsor	289-302	46650	1½	34	2½	8	46601	45019	45008
70-71 Comet and Cyclone (3)	Cleveland (4V)	351	46670	1½	36	3½	10	46631	45016	45012
71-73 Comet (3)	Windsor	302	46720	1½	34	3	10	46601	45015	45006
72-74 Montego (2)	Cleveland (2V)	351-400	46590	1¾	36	3	10	46581	45015	45012
71-73 Capri		2000cc	46710	1½	40	2½	8	46711	47504	45009

OLDSMOBILE

65-72 Oldsmobile	400-455	45700	1¾	32	3	10	45701	45015	45005
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PLYMOUTH

67-69 Barracuda	273-340(19)	46000(1)	1½	36	3	10	46001	45015	45007
70-73 Duster	273-340(19)	46000(1)	1½	36	3	10	46001	45015	45007
67-74 Belvedere, Roadrunner	318-340(19)	46010(1)	1½	36	3	10	46001	45015	45007
70-74 Barracuda	318-340(19)	46010(1)	1½	36	3	10	46001	45015	45007
66-74 (Wedge Engine)	383-400	46110(1)	1¾	35	3	10	46111	45015	45005

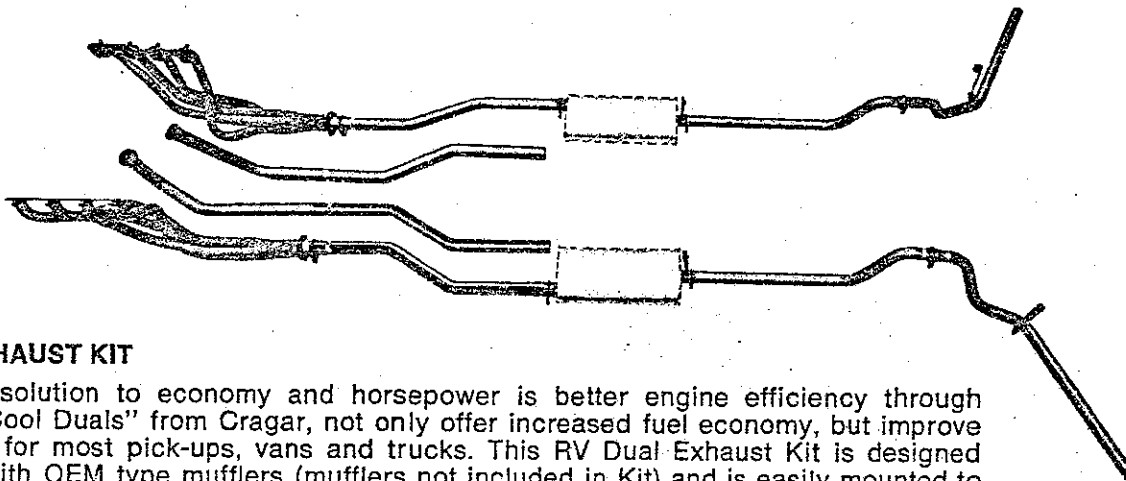
PONTIAC

64-72 GTO (14)	389-400	45800	1¾	32	3	10	45801	45015	45005
67-69 Firebird	389-400	45850	1¾	32	3	10	45801	45015	45005
70-73 Firebird	400	45800	1¾	34	3	10	45801	45015	45005
72-73 Ventura II (10)	350	45850	1¾	32	3	10	45801	45015	45005

FOREIGN CARS

YEAR & MODEL	Engine	Header Kit Part No.	Tube Size (inch)	Tube Lng. (inch)	Coll. Size (inch)	Coll. Lng. (inch)	INCLUDED IN HEADER KIT for replacement parts only		
							Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.
OPEL									
69-72 GT	1900cc	49000*	1½	26	2½	8	49001	47504	45009
PORSCHE									
56-65 356 (12) (16-RR)		49200*	1½	36	2½	4	49201	47504	45009
66-69 912 (16-LR)	1600cc	49210*	1½	36	2½	4	49201	47504	45009
66-72 911 (16-LR)	6 cyl.	49220*	2	18	2	3	49221	(6)	(6)
TOYOTA									
71-73 Corona and Celica	1900cc	49300*	1½	24	2½	4	49301	47504	45009
VOLKSWAGEN*									
61-72 Passenger, Ghia with muffler	E40, 40 HP	1300-1500cc	47500	1½	30	2½	4	47505	47504 47503
63-67 Bus with muffler									
Dune Buggy Extractor with Muffler (16)	1300-1600	47530*	1½	46	2½	3	47505	47504	45009
Dune Buggy (Racing, Single Seater)		47540—Order 25 sets—Minimum Quantity							

CAMPERS - PICKUPS - VANS - TRUCKS - JEEPS



RV DUAL EXHAUST KIT

The easiest solution to economy and horsepower is better engine efficiency through breathing. "Cool Duals" from Cragar, not only offer increased fuel economy, but improve performance for most pick-ups, vans and trucks. This RV Dual Exhaust Kit is designed to be used with OEM type mufflers (mufflers not included in Kit) and is easily mounted to factory installed exhaust manifolds or Cragar's Headers.

- Cragar "Cool Duals" Kit, installed with OEM type mufflers will meet the noise emissions levels of most states.
- Cragar will not assume responsibility of fit, if "Cool Duals" are used with headers other than Cragar's.
- All "Cool Duals" feature 2 1/4" headpipes and 2" tail pipes.
- For vehicles equipped with auxiliary fuel tanks, other than factory installed original equipment, "Cool Duals" may have to be modified, in which case, Cragar will not be responsible for fit.
- For vans that have been converted to camping use and have been equipped with holding tanks, propane bottles or auxiliary fuel tanks mounted on the under carriage, "Cool Duals" may have to be modified for installation. Cragar will not assume responsibility for fit after modifications.

Suggested OEM type mufflers for "Cool Duals": IPC-2470, Gidon-3007, Goerlich-M592, Walker-21206

HEADERS

Cragar "Hot Pipes" Headers are pure scavenging headers developed by engineers and racers who demand maximum performance from an exhaust system. Cragar headers are constructed to meet exacting factory specifications and all flanges are carefully fitted, heliarced and ground smooth for leakproof installation. A one-year guarantee is included.

YEAR & MODEL	Engine	RV Dual Exhaust Kit No.	Header Kit Part No.	Tube Size (inch)	Tube Lgh. (inch)	Coll. Size (inch)	Coll. Lgh. (inch)	INCLUDED IN HEADER KIT for replacement parts only		
								Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.
CHEVROLET										
64-73 Chevelle, El Camino (18)	396-454	N.A.	45210	2	36	3½	10	45011	45016	45006
64-74 Chevelle, El Camino (17) (18)	283-350	N.A.	45200	1¾	31	3	10	45001	45015	45005
55-59 Pickup (10) (17) (18)	283-350	N.A.	45500(1)	1⅝	30	3	10	45001	45015	45005
63-68 Pickup (17) (18)	283-350	N.A.	45530(11)	1⅝	30	3	10	45001	45015	45005
65-67 Pickup (25)	396-454	N.A.	45510	1¾	32	3	10	45511	45015	45006
68-74 C10, C20 (18)	396-454	44510(21)(23)	45510	1¾	32	3	10	45511	45015	45006
69-72 C10, C20 (17) (18)	283-350	44530(21)	45530(11)	1⅝	30	3	7	45001	45015	45005
73-74 C10, C20 (17) (18)	307-350	44560(21)(23)	45530(11)	1⅝	30	3	7	45001	45015	45005
69-72 C10, C20 (Four Wheel Drive) (17) (18)	350	44550(21)	45530(11)	1⅝	30	3	7	45001	45015	45005
73-74 C10, C20 (Four Wheel Drive) (17) (18)	307-350	44540(21)	45530(11)	1⅝	30	3	7	45001	45015	45005
69-72 Blazer (Four Wheel Drive) (17) (18)	283-350	44550	45530(11)	1⅝	30	3	7	45001	45015	45005
73-74 Blazer (Four Wheel Drive) (17) (18)	307-350	44540(21)	45530(11)	1⅝	30	3	7	45001	45015	45005
71-74 All Vans (18)	307-350	44520(21)	45520	1⅝	32	3	10	45001	45015	45005
DATSUN										
70-71 Pickup with smog device	1600cc	N.A.	49120*	1½	30	2½	8	49111	47504	45009
DODGE										
68-74 Pickup D100, D200	383-400-440	N.A.	46130(1)(2)	1¾	34	3	10	46111	45015	45005
70-74 Van	318-340	44850	46050(1)	1⅝	34	3	10	46001	45015	45007
74 Van	360	44850	46050(1)(22)	1⅝	34	3	10	46001	45015	45007
74 Ramcharger (Four Wheel Drive)	318-360	44870	46060(1)	1⅝	32	3	7	46001	45015	45007
72-74 Pickup W100, W200 (Four Wheel Drive) w/o aux. fuel tank	318-360	44880	46060(1)	1⅝	32	3	7	46001	45015	45007

* to be discontinued when present stock is depleted

FOOTNOTES ON PAGE 6

STREET ROADSTER - SPRINT CAR

MAKE	Engine	Header Kit Part No.	Tube Size (inch)	Tube Lngth. (inch)	Coll. Size (inch)	Coll. Lngth. (inch)	INCLUDED IN HEADER KIT for replacement parts only		
							Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.
Chevrolet and Sprint Car Kit (16)	283-400	45610(5)	1¾	32	3	18	45001	45015	45005

BOAT

Ford*	390-428	48200	2	32	3½	24	46611	(6)	(6)
Ford*	Cleveland (4V) 302-351	48220	2	36	3½	24	46631	(6)	(6)
Chrysler*	426	48300	2	36	3½	24	46121	(6)	(6)

DRAGSTER

ENGINE		Header Part No.	Header Part No.	Tube Size (inch)	Tube Lngth. (inch)	Coll. Size (inch)	Coll. Lngth. (inch)	INCLUDED IN HEADER KIT for replacement parts only		
								Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.
426 Hemi (24)	26" Car	48526-200	30" Car	48530-200	2	22	—	(6)	—	(6)
		48526-225		48530-225	2¼	22	—	(6)	—	(6)
		48526-250		48530-250	2½	22	—	(6)	—	(6)
392 Hemi (24)	26" Car	48626-200	30" Car	48630-200	2	22	—	(6)	—	(6)
		48626-225		48630-225	2¼	22	—	(6)	—	(6)
		48626-250		48630-250	2½	22	—	(6)	—	(6)
427 Chevy (24)	26" Car	48726-200	30" Car	48730-200	2	22	—	(6)	—	(6)
		48726-225		48730-225	2¼	22	—	(6)	—	(6)

* to be discontinued when inventory exhausted.

FOOTNOTES

- (1) Smog fitting not available on this model.
- (2) Will not fit manual transmission without altering parts.
- (3) Power steering bracket #46612 - two pieces.
- (4) Power steering bracket #46613 - one piece.
- (5) Kit - all parts supplied.
- (6) Not supplied.
- (7) Will not fit 1967 models with factory air.
- (8) 64-67 Cougar and Mustang 289-302/68-73 Cougar and Mustang 289-351.
- (9) Cragar headers dated before 12/74 will not fit with Saginaw and Bendix (with bubble side) power steering.
- (10) Will not fit automatic transmission without altering parts.
- (11) Will not fit with winch power take off.
- (12) Will not fit power steering without altering parts.
- (13) Will not fit air conditioning without altering parts.
- (14) Brake lines distribution block must be moved 68-72.
- (15) Will not fit power brakes without altering parts.
- (16) Right rear exit area.
- (17) Bracket is necessary to mount A/C pump. Please see components part listing page 7.
- (18) Parts are necessary to re-connect hot air tube to air cleaner - Please see components parts list page 7.
- (19) This header will also fit 360 cu. in. engine without air pump system.
- (20) Will not fit with factory swaybar.
- (21) Will fit leaf springs only.
- (22) Will not fit models with smog pump.
- (23) For Crew Cab application, two-44514 additional head pipe extensions are required.
- (24) For rear engine type with a wing over rear wheels, write "W" in front of the part number when ordering.
- (25) Will fit automatic only.

REPLACEMENT PARTS - FOR RV DUAL EXHAUST KITS

RV Dual Exhaust Kit Part Number	Left Head Pipe	Right Head Pipe	Left Head Pipe Extension	Right Head Pipe Extension	Left Tail Pipe	Right Tail Pipe	Mounting Hardware Kit	Head Pipe Gaskets	Head Pipe Flange
44510	44511	44512	44513	44513	44515	44516	44627	44501	N.A.
44520	44521	44522	44513	44513	44515	44516	44527	44502	44503
44530	44531	44532	44533	44534	44515	44516	44527	44502	44503
44540	44541	44542	44543	44544	44515	44516	44517	44502	44503
44550	44551	44552	44543	44544	44515	44516	44517	44502	44503
44560	44541	44542	44563	44563	44515	44516	44527	44502	44503
44710	44721	44722	44713	44724	44715	44516	44727	44711	N.A.
44720	44721	44722	44723	44724	44515	44516	44627	44711	N.A.
44730	44731	44732	44733	44734	44515	44516	44627	44711	N.A.
44740	44741	44742	44743	44744	44515	44516	44627	44711	N.A.
44750	44741	44742	44773	44744	44715	44516	44727	44711	N.A.
44760	44751	44752	44753	44754	44755	44756	44627	44502	44706 Installed on Head Pipe
44770	44731	44732	44763	44734	44715	44516	44727	44711	N.A.
44780	44781	44782	44783	44783	44515	44516	44627	44501	N.A.
44790	44781	44782	44793	44783	44715	44516	44727	44501	N.A.
44850	44831	44832	44833	44833	44515	44516	44627	N.A.	44504
44870	44841	44842	44843	44843	44515	44516	44627	N.A.	44504
44880	44841	44842	44853	44854	44515	44516	44627	N.A.	44504

CAMPERS - PICKUPS - VANS - TRUCKS - JEEPS

YEAR & MODEL		Engine	RV Dual Exhaust Kit No.	Header Kit Part No.	Tube Size (inch)	Tube Lngh. (inch)	Coll. Size (inch)	Coll. Lngh. (inch)	INCLUDED IN HEADER KIT for replacement parts only		
									Header Gask. No.	Coll. Gask. No.	Bolt Pk. No.
FORD											
63-71 Ranchero	Windsor	289-302	N.A.	46650(4)	1½	34	2½	8	46601	45019	45006
70-71 Ranchero	Cleveland (4V)	351	N.A.	46670(4)	1¾	36	3½	10	46631	45016	45012
72-74 Ranchero	Cleveland (2V)	351-400	N.A.	46590(2)	1¾	36	3	10	46581	45015	45012
68-74 Van	Windsor	302	44760	46760	1½	30	3	10	46601	45015	45006
66-73 Bronco		289-302	N.A.	46790	1½	36	2½	8	46601	45019	45006
66-74 Pickup F100, F250 (w/o aux. fuel tank)		352-390	44720	46750(7) (9)	1¾	30	3	7	46611	45015	45006
65-74 Pickup F100, F250 (with aux. fuel tank)		352-390	44710	46750(7) (9)	1¾	30	3	7	46611	45015	45006
65-74 Pickup F100 w/o aux. fuel tank (Four Wheel Drive)		360-390	44730	46800	1¾	30	3	7	46611	45015	45006
65-74 Pickup F100 with aux. fuel tank (Four Wheel Drive)		360-390	44770	46800	1¾	30	3	7	46611	45015	45006
69-74 F250 w/o aux. fuel tank (Four Wheel Drive)		352-360	44740	46770	1¾	30	3	7	46611	45015	45006
69-74 F250 with aux. fuel tank (Four Wheel Drive)		352-360	44750	46770	1¾	30	3	7	46611	45015	45006
74 F100, F250 w/o aux. fuel tank		460	44780	46810(20)	1¾	30	3	7	46561	45015	45006
74 F100, F250 with aux. fuel tank		460	44790	46810(20)	1¾	30	3	7	46561	45015	45006
GMC											
70-74 Sprint (17) (18)		350	N.A.	45200	1¾	31	3	10	45001	45015	45005
70-73 Sprint (18)		396-454	N.A.	45210	2	36	3½	10	45011	45016	45006
67-68 Pickup - Jimmy Including 4WD (17) (18) ½T, ¾T, Suburban, 1T Trucks		263-350	N.A.	45530(11)	1½	30	3	7	45001	45015	45005
69-72 C10, C20 (17) (18)		283-350	44530(21)	45530(11)	1½	30	3	7	45001	45015	45005
73-74 C10, C20 (17) (18)		307-350	44560(21) (23)	45530(11)	1½	30	3	7	45001	45015	45005
69-72 C10, C20 (Four Wheel Drive)(17) (18)		350	44550(21)	45530(11)	1½	30	3	7	45001	45015	45005
73-74 C10, C20 (Four Wheel Drive)(17) (18)		307-350	44540(21)	45530(11)	1½	30	3	7	45001	45015	45005
68-74 Pickup (18)		396-454	44510(21) (23)	45510	1¾	32	3	10	45511	45015	45006
71-74 Van (18)		307-350	44520	45520	1½	32	3	10	45001	45015	45005
JEEP											
CJ5 & 6 Jeep		304		45910(1)	1½	32	3	10	47001	45015	45005
PLYMOUTH											
74 Trail Duster (Four Wheel Drive)		318-360	44870	46060(1)	1½	32	3	7	46001	45015	45007
74 Van		318-340	44850	46050 (1)	1½	34	3	10	46001	45015	45007
74 Van		360	44850	46050(1)(22)	1½	34	3	10	46001	45015	45007

REPLACEMENT PARTS FOR RV DUAL EXHAUST KITS ON PAGE 6

HEADER ACCESSORIES AND COMPONENT PARTS

HEADER KIT INCLUDES GASKETS, SWEDGES AND ALL HARDWARE NECESSARY FOR BOLT-ON INSTALLATION, INCLUDING GENERATOR AND ALTERNATOR BRACKET. DOES NOT INCLUDE AIR CONDITIONING BRACKETS OR POWER STEERING BRACKET, MUST ORDER SEPARATELY.

	APPROXIMATE SHIPPING WEIGHT
Passenger Cars, Datsun 240-Z, Boats V8 and 6 cylinder	35 lbs.
Chevrolet Street roadster, Trucks, Van and Dragsters	35 lbs.
Without Smog Fittings — Mini Cars, Foreign Cars (except VW & Porsche)	25 lbs.
Mini Trucks, Foreign Trucks	25 lbs.
All with Smog Fittings — Mini Cars, Foreign Cars (except VW & Porsche)	25 lbs.
Mini Trucks, Foreign Trucks	25 lbs.
Porsche	26 lbs.
Volkswagen Dune Buggy (extractor system)	16 lbs.

COMPONENTS

	PART NO.	APPROXIMATE SHIPPING WEIGHT
CHEVROLET SMOG FITTINGS excluding those footnoted (†) Put an 'S' after Header Kit Part number when ordering.	S	Included in Header Kit
HOT AIR HOOK-UP—Small Block Chevy Flex hose and necessary clamps and fittings to connect up heater air to air cleaner for emission controls.	45523	12 oz.
HOT AIR HOOK-UP—Big Block Chevy Flex hose and necessary clamps and fittings to connect up heater air to air cleaner for emission controls.	45525	12 oz.
POWER STEERING BRACKET Power Steering Bracket to Lower Both Ends of Cylinder. (2 Brackets & 1 Bolt & Nut.) Power Steering Bracket to Lower Frame End of Cylinder. (One Bracket.)	46612 46613	4 lbs. 2 lbs.
HEADER GASKETS—See Header Gasket Part No. Column for Correct Part No.		3½ oz.
TAPERED REDUCERS—Triangle flange 2½" Flange to 2" O.D.—Pair 3" Flange to 2¼" O.D.—Pair 3½" Flange to 2½" O.D.—Pair	45018 45014 45013	1 lb. 1½ lbs. 2 lbs.
COLLECTOR GASKETS—Triangle flange 2½" I.D.—Pair 2½" I.D.—Pair 3" I.D.—Pair 3½" I.D.—Pair	47504 45019 45015 45016	1 oz. 1 oz. 1 oz. 1 oz.
BOLT PACKS 12 Header Bolts ⅜-16x¾" and 6 Collector Bolts and Nuts ⅜-16x1" 16 Header Bolts ⅜-16x¾" and 6 Collector Bolts and Nuts ⅜-16x1" 12 Header Bolts 5/16-16x¾" and 6 Collector Bolts and Nuts ⅜-16x1" 28 Header Bolts ⅜-16x¾" and 6 Collector Bolts and Nuts ⅜-16x1" 6 Collector Bolts and Nuts ⅜-16x1" 16 Header Bolts ⅜-16x1" and 6 Collector Bolts and Nuts ⅜-16x1"	45005 45006 45007 45008 45009 45012	12 oz. 15 oz. 12 oz. 28 oz. 6 oz. 15 oz.
ACCESSORY MOUNTING BRACKET Air Conditioning Bracket for Right or Left Side of Small Block-Type Chevy Engine. (Bracket & 2 Bolts) Alternator or Generator Bracket for Right (Passenger) Side of Small Block-Type Chevy Engine. (Bracket & 2 Bolts) Alternator or Generator Bracket for Left (Driver) Side of Small Block-Type Chevy Engine. (Bracket & 2 Bolts)	45422 45302† 45402†	12 oz. 12 oz. 12 oz.

† This Part Number supplied with Headers as necessary.

Cragar Products are used and recommended by many of the record holding racers of the following associations:



CRAGAR INDUSTRIES INC. 19007 South Reyes Avenue, Compton, California 90221 (213) 639-6211



INDUSTRIES INC.

 POST OFFICE BOX 5626
 19007 S. REYES AVENUE
 COMPTON, CALIF. 90224

(213) 639-6211

CRAGAR HEADERS # 45560 S.C. 1975-76 Chevy Pickup with Catalytic Converter

A WORD ABOUT CRAGAR HEADERS

You will find Cragar Headers to be of the best engineered exhaust units on the market. Their efficient "free flow" design and simplified bolt-on installation results from the latest information available to engineers and racers who demand maximum performance from an exhaust system.

IMPORTANT NOTE: Because of the limited amount of room in most of the engine compartments of today's automobiles, a few space problems may become evident, forcing header units very close to engine and chassis components. This is quite normal on most applications.

PREPARATION: Your car must be raised at least 24 inches for installing the headers. Cragar recommends the use of a hoist or similar type lifting device. **DO NOT USE BUMPER JACKS.**

NOTE: On 4 x 4 trucks - the spring shackle bolts at the rear of front springs must be installed with head of bolt to inside of spring.

INSTALLATION:

Left Side

1. Disconnect battery cable to avoid damage to the truck's electrical system.
2. Unbolt stock head pipe, cross over pipe and disconnect at muffler and remove from truck.
3. Remove oil filter, clutch linkage, dip stick tube, spark plugs, stock exhaust manifold. (On earlier models remove alternator or generator).
4. Starting from below, work header through chassis and into position.
5. Place gasket in position and start bolts (most restricted first).
6. Tighten all bolts (most restricted first).
7. Replace oil filter, clutch linkage, dip stick tube and spark plugs.

Right Side

1. Remove stock exhaust manifold, spark plugs and starter.
2. Starting from below, work header through chassis and into position. Start front bolt only.
3. Replace starter.
4. Remove front bolt, place gasket into position and start all bolts. (Most restricted first).
5. Tighten all bolts. (Most restricted first).
6. Replace spark plugs.
7. Attach the left side head pipe section to the converter using the existing clamps. Connect the other end to the header using the bolts and gasket provided.
8. Install the right side pipe to the left side pipe using the clamps supplied and bolt to header with gasket and bolts provided.

QUALITY IN DESIGN, MATERIALS AND WORKMANSHIP

APPENDIX C (Cont'd.)

CRAGAR HEADERS #45560 S.C. 1975-76 Chevy Pickup
with Catalytic Converter

9. Using the tubing supplied, make the air injector pump connection, if vehicle is so equipped, using the hose clamps supplied. The existing tubing must be cut off in the straight section running parallel to the oil pan.
10. Connect battery cable, start the engine and check for leaks. After several hours of running time, retighten all header bolts.

NOTE:

- * Air conditioning mounting bracket is necessary, #45422 for right and left side.
- * Illustration to help reconnect power steering pump bracket.
- * If alternator bolts to end of exhaust manifold use Chevy Part No. 3825461 bracket and 3825451 spacer which will bolt to bracket provided with your headers.

If you have a comment regarding Cragar Headers or their installation, let us know!